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ABSTRACT

A national survey was conducted during the 1987-88 academic year to investigate the characteristics of selected high quality elementary schools known for their support of instructional technology. Of the 73 schools contacted, 70% responded to the survey. The findings showed that available computer time was most often divided among three major uses: computer applications (29%), computer assisted learning (55%), and computer programming (14%). Some of the total programming time was typically allotted to both Logo and BASIC, with about 64% more time spent on Logo. The three specific activities that occurred most frequently--drill and practice (24%), word processing (18%), and tutorials (12%)--accounted for more than one-half (54%) of the total computer access time. Although school leaders must allocate available computer time to agree with the general philosophy and goals of their particular school and the more explicit objectives of their specific instructional computing programs, they need to consider greater variety in computer activities, including a shift in emphasis to computer applications. However, such a shift would require increased training and computer hardware, and thus certainly greater expenditures. (2 references) (EW)

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HOW ARE SUCCESSFUL ELEMENTARY SCHOOLS ALLOCATING THEIR INSTRUCTIONAL COMPUTING TIME?

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by
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INTRODUCTION

Has the public outcry for increased emphasis on drug education, AIDS awareness, teen suicide prevention, and similar current issues caused American public school administrators to shift their support from instructional computing to other programs? Are microcomputers being relegated to the back shelves with Dukane projectors and other technological relics of the past? How can the extant computers be used in ways that justify the expense they represent? As school administrators confront increased calls for budgetary accountability, they must also justify that computers are used in ways that are educationally supportable. These and related issues suggested the need for a study to determine how the nation's leading elementary school administrators use computers instructionally to guarantee they get the maximum "bang" for their computer buck.

OUTLINE OF THE STUDY

A national study was conducted during the 1987-88 academic year to investigate characteristics of selected high quality elementary school

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in Washington, D.C., supplied a list of districts known for their support of instructional technology. Representatives from these districts then identified the particular elementary schools within their regions which they believed had developed the most outstanding instructional computing programs.

The resulting 73 schools were then surveyed (with a 70% response rate), using an instrument which gathered data on topics relating to their instructional computing programs: the ratio of students to computers, the total computer-related expenses, the 1986 and 1987 computer budgets, the presence or absence of computer expenses as permanent line items in the budget, school planning process characteristics, computer uses considered the most important in facilitating student learning, and the actual and ideal allocation of computer access time. Using Taylor's categories, the study highlighted an examination of the schools' allocation of available computer time[1]. Respondents divided their computer usage into the following categories: computer-assisted learning (as a "tutor"), computer programming (as a "tutee"), computer use with an application program (as a "tool"), and other computer uses.

FINDINGS

In the elementary schools surveyed, the available computer time was most often divided between the three major uses: computer applications, computer-assisted learning, and computer programming. Computer time was typically allocated with approximately 55% for computer-assisted

learning, 29% for computer applications, 14% for computer programming, and the remaining 2% for other uses. Some of the total programming time was typically allocated to both Logo and BASIC, with about 64% more time spent on Logo. See Table I for more detailed figures.

Table I: Mean Allocation of Computer Time

Type of Computer Activity	Mean % of total access time Devoted to each Activity
TOTAL COMPUTER PROGRAMMING	*14%*
BASIC	5%
Logo	9%
TOTAL COMPUTER-ASSISTED LEARNING	*55%*
Drill and Practice	24%
Tutorials	12%
Simulations	9%
Educational Games	9%
Other CAL	1%
TOTAL APPLICATION PROGRAMS	*29%*
Word Processing	18%
Data Bases	3%
Spreadsheets	0%*
Printing Utilities	8%
Other Applications	0%*
TOTAL OTHER COMPUTER USES	*2%*
TOTAL % OF COMPUTER TIME	*100%*

* Each is roughly 0.3%

The majority of the successful programs included the following computer-assisted learning uses: drill and practice programs, tutorials, simulations, and educational games. Most programs also included computer applications such as word processing, using printing utilities, and manipulating data

bases. The three specific activities with highest frequency of occurrence accounted for more than half (54%) of the total computer access time--drill and practice (24%), word processing (18%), and tutorials (12%).

The investigation of the respondents' ideal allocation of computer time revealed a shift in emphasis. The manner in which instructional computing leaders actually allocate their available computer time differs notably from the way they said they would like to do so ideally. Respondents indicated they would prefer to devote less time to computer-assisted learning and more time to computer applications such as word processing or using printing utilities.

45% of the schools indicated that they would ideally allocate one-half or more of their total computer time to computer-assisted learning, down from the 67% of the schools that actually allocated that amount of their computer time to computer-assisted learning. In contrast, 47% of the respondents said they would ideally spend one-half or more of their computer time to computer applications, up from the 24% of the schools that actually allocated that amount of their computer time to computer applications. Overall, the ideal computer time allocations showed a lesser emphasis on computer-assisted learning and a correspondingly greater emphasis on computer applications.

The respondents reported that a variety of computer activities take place in their schools. These responses parallel other findings noted, such as an

emphasis on computer integration, a high level of staff involvement in the computing program, and the activities identified as the most important methods of facilitating student learning at the present time. To help illustrate the total computer usage situation, it is useful to estimate the total amount of available computer time.

The typical school responding to the survey had one computer available for approximately every 20 students. Assuming that clever scheduling could make available a maximum of 6 computer hours per machine per day, and assuming that all students were given equal access to the computers, the typical school would have nearly 90 minutes of computer time per week for each student. Using the computer time allocations found in this study, those 90 minutes represent a weekly per student average of roughly 50 minutes for drill and practice, 27 minutes for applications, and 13 minutes for computer programming.

These time estimates and the actual computer time allocations discovered differ dramatically from the findings reported elsewhere. Snyder and Palmer (1986), for example, estimate that twenty minutes total time (per week) is typical in elementary schools[2]. Their conclusions concerning the manner in which computer time is allocated--about 40% on drill and practice, 33% on computer programming, and most of the other 27% on educational games--also differ from this study's findings. (These differences may be at least partially explained by sample differences--that is, high quality programs compared to all programs.)

SUMMARY AND IMPLICATIONS

The available computer access time in the typical high quality elementary school instructional computing program was divided between three major activities: computer programming, computer applications (using the computer as a "tool"), and computer-assisted learning (CAL). In terms of the total time spent, the two most important of these activities, were computer-assisted learning and computer applications. The typical school allocated its available computer time so that 14% was spent on computer programming, 29% on computer applications, 55% on computer-assisted learning activities, and 2% on various other activities. The three specific activities which occurred most frequently--drill and practice (24%), word processing (18%), and tutorials (12%)--accounted for more than one-half (54%) of the total computer access time.

Most schools that included computer programming allocated time to both Logo and BASIC. The majority of schools used CAL programs which included the use of, in order of importance, drill and practice programs, tutorials, simulations, and educational games. The majority of schools also encouraged word processing, the use of printing utilities, and the manipulation of data bases. Finally, the instructional computing leaders indicated that they would prefer to devote less time to CAL and more time to computer applications as the major difference between their actual and their ideal allocation of the available computer time.

School leaders must allocate available computer time to agree with the general philosophy and goals of their particular school and the more explicit objectives of their specific instructional computing program. Still, they should consider sharing the available computer time to support varied application and computer-assisted learning activities. They should be especially cognizant of the amount of computer hardware and teacher training required by their chosen time allocation pattern and should be certain that their choice can be supported by the existing funding level in the present computer budget.

School leaders should also consider the suggested shift in emphasis from computer-assisted learning to computer application usage. The respondents' projected computer uses may require more hardware and teacher training than present utilization modes. The increase in the amount of time devoted to computer applications, and the corresponding decrease in the computer-assisted learning time, will have important implications for computing program developers. Computer application usage often requires more computer hardware and more teacher training than computer-assisted learning. Clearly, any increase in the amount of hardware and training must also be accompanied by an increase in the expenditure levels afforded to the instructional computing programs.

In order for the survey respondents' projections to be realized, spending on instructional computing will almost certainly have to be increased. Despite that obvious necessity, respondents indicated that instructional computing

program budgets are actually declining. These disparities have serious implications for all individuals interested in educational computing. The practices of the leaders of quality programs should offer guidance to all elementary school administrators in using their computers instructionally. Nevertheless, to guarantee they get the best educational value for their computer dollars, leaders must realize that additional expenses are required to maintain programs that are current with the practices of the nation's leading elementary schools.

REFERENCES

1. Taylor, Robert, Ed. The Computer in the School: Tool, Tutor, Tutee. New York: Teachers College Press. 1980.

2. Snyder, Tom, and Jane Palmer. In Search of the Most Amazing Thing. Reading: Addison-Wesley Publishing Company. 1986.